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FOREST HEALTH IN SOUTH-CENTRAL ALASKA

by

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This report presents impressions and opinions on the current large and rapidly increasing spruce beetle infestation in south-central Alaska. These views are based on limited direct experience in Alaska; however, State and Federal foresters, entomologists, and other officials provided the visitation team with a thorough office and field review of the problem on August 18-20, 1993. I have worked closely with forest health and long-term productivity issues and practices in the inland northwest over the past several years. Although this experience is from a somewhat different forest environment, many of the causal factors seen in Alaska are quite similar to those related to extensive insect and disease problems in the interior west.

State of Alaska and U.S. Forest Service people have a good grasp of the problem and the review team cannot add much to the basic knowledge of spruce bark beetle ecology and management. However, as outsiders, perhaps we can provide a fresh look at the problem, evaluate the conclusions of Alaskan professionals, and provide suggestions for action.

When faced with dramatic insect outbreaks such as the spruce beetle infestation, the first question is often whether or not the outbreak is an abnormal occurrence or merely part of the natural process. Plant succession in Alaska has not advanced far enough to provide much historical evidence of just what is within the range of natural variability. However, in my judgement, the widespread

spruce beetle mortality in south-central Alaska is far beyond "normal". An outbreak of this magnitude is symptomatic of more basic problems of long-term health and productivity.

If the forest is indeed in an "unhealthy" state, it seems only appropriate to make a vigorous effort to improve its health. We have been quite successful at convincing the public that wildfire in the forest is not desirable, and that fire prevention and sizeable investments in fire breaks and other control measures are desirable and necessary. We have obviously not made the necessary effort to educate the public on the consequences of insect and disease outbreaks, and public support is necessary for large-scale prevention and control measures.

A major problem is in defining the indicators of health. We don't have a convenient analog to checking human blood pressure or cholesterol level. Research is underway to provide better indicators of forest health and the trends in long-term productivity, but the best technique now available is careful long-term monitoring.

The Society of American Foresters task force on Sustaining Long-Term Forest Health and Productivity stated that ... "Forests can be considered healthy when there is an appropriate balance between growth and mortality. Having the resilience to react and overcome various stressors is a key indicator of health, and is a key objective of ecosystem management". A tremendous resource is being altered by the spruce bark beetle in Alaska and there does not appear to be an appropriate balance between growth and

mortality. The forest is not resilient and a combination of factors has likely made it susceptible to epidemic levels of beetle activity. The infestation is not only causing losses of wood fiber value but is impacting fish and wildlife habitat, water quality, the visual resource, and recreation. Of immediate concern is the creation of high fuel loading with potential for catastrophic wildfires.

Forestry professionals in Alaska are to be commended for a thorough analysis of the forest health situation. A risk model has been developed which identifies important tree, site, and stand variables related to spruce bark beetle outbreaks (high BA of spruce, % of total BA greater than 10" Dbh, and aspect). Site disturbance appears to trigger outbreaks and recent abnormally warm/dry summer seasons change beetle life cycles from one in 2 or 3 years to a complete cycle in one year. The more susceptible older age classes dominate much of the area, and in the absence of management, more stands will be moving into this condition. Aerial observation by the review team confirmed high mortality levels in pure, dense, mature stands.

High stand density levels cause competition for scarce site resources and also slow soil warming in the spring. Warm air temperatures while tree roots are in cold or frozen soil causes severe stress -- another factor leading to low vigor and increased susceptibility to successful beetle attack.

Managers are fully aware of silvicultural practices which can reduce susceptibility to beetle outbreak:

- 1) reduce stand density through thinning,
- 2) reduce the component of old, slow-growing trees,
- 3) encourage development of mixed-species composition, and
- 4) prune lower branches, allowing more soil warming.

Some of these practices have been successfully applied on a limited basis on the Kenai Peninsula, so further action may be taken based on experience. A key to management should be to create and maintain diversity -- not only in the tree component but in the diversity of understory vegetation and in the types of stands across a landscape.

Tree nutrition has also been shown to be strongly associated with bark beetle mortality in other western U.S. forests. The nutritional needs of spruce in south-central Alaska should be determined. Foliar and soil analysis would then indicate if the spruce is deficient in important nutrients. Potassium is of particular interest since this nutrient plays an important role in insect and disease resistance. About one-half of the potassium budget of coniferous forests is held in the foliage and small branch materials. It is therefore important to retain as much of this material as possible on site after logging or thinning -- a practice disturbing to those with fire hazard reduction responsibilities. (changes in slash disposal regulations are currently being reviewed in Idaho because of the new evidence of the importance of slash retention to long-term health and productivity)

The management practices reviewed above would be expensive to apply over large areas. However, the losses to the various resource values, employment opportunities, and the potential losses due to wildfire may be even greater. The fuel loading in areas of beetle-caused spruce mortality has the potential for creating extremely high property loss and control could be difficult and costly. What changes in funding will be necessary to implement an aggressive management policy?

Assessment of the implications of any proposed course of action should include input by a wide range of resource professionals and the public should be made aware of the consequences of no action as well as various proposed silvicultural practices. What are the risks associated with continuation of custodial management and the risks associated with an aggressive plan of management? What are the impacts of alternatives on the economic viability of the State?

Opportunities for working with beetle problems are, of course, governed by accessibility. Vast areas of current and potential outbreaks are in remote unroaded areas. Salvage and management will of necessity be limited to areas of higher value and better accessibility. However, assessment of the action or no action alternatives should be made for all spruce sites.

Systematic monitoring of the results of practices and of the no-action alternative is extremely important. Ecological and economic impacts should be regularly assessed.

In summary:

- 1) The rapidly expanding spruce bark beetle damage is not, in my judgement, a normal natural occurrence. A combination of events and conditions is probably working together to cause this level of mortality.
- 2) Resource professionals in the region have a good grasp of the causal factors and are knowledgeable of action which can reduce the damage. Aggressive application of current knowledge can help to reduce future losses.
- 3) Investigate the nutritional status of spruce sites and the nutritional needs of the species as a basis for possible action to improve and maintain tree and stand vigor.
- 4) Salvage of beetle-killed spruce and green material extracted as a part of thinnings and other management provide a marketable raw material resource. Recent increases in log prices provide opportunities which did not exist as recently as two years ago.
- 5) Risk assessment of action and no action alternatives by interdisciplinary teams on a site by site basis is necessary in order to fully understand the consequences of decisions.
- 6) A monitoring program which tracks changes in the forest ecosystem in action as well as no-action units is necessary to properly assess the results of land-management decisions.
- 7) An aggressive public involvement and education program is recommended. The public must be made aware of the implications of insect outbreaks as has been done with wildfire. Increased public awareness of the value of the wood fiber and other resources and potential ties to their well-being and to the state's economy should be beneficial in gaining support for management decisions.